A Senior Citizen Monitoring System

Team: IOSenior

Members

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Objective

- Develop a system to help people remotely monitor elderly family in a non-intrusive fashion within their home

Importance/Value Proposition

- Provides easy check-ins without having to physically or call, while allowing for the resident to maintain a high level of privacy.

A Quick Review From Last Time

Scope/Specifications

- Remote accessible data
- Work for those who live:
  - Alone
  - Multi floor home
  - Apartment
- General public use
- Discrete
- Multiple sensing methods
- Potential expansion
- Budget friendly
- Home only

Microcontrollers

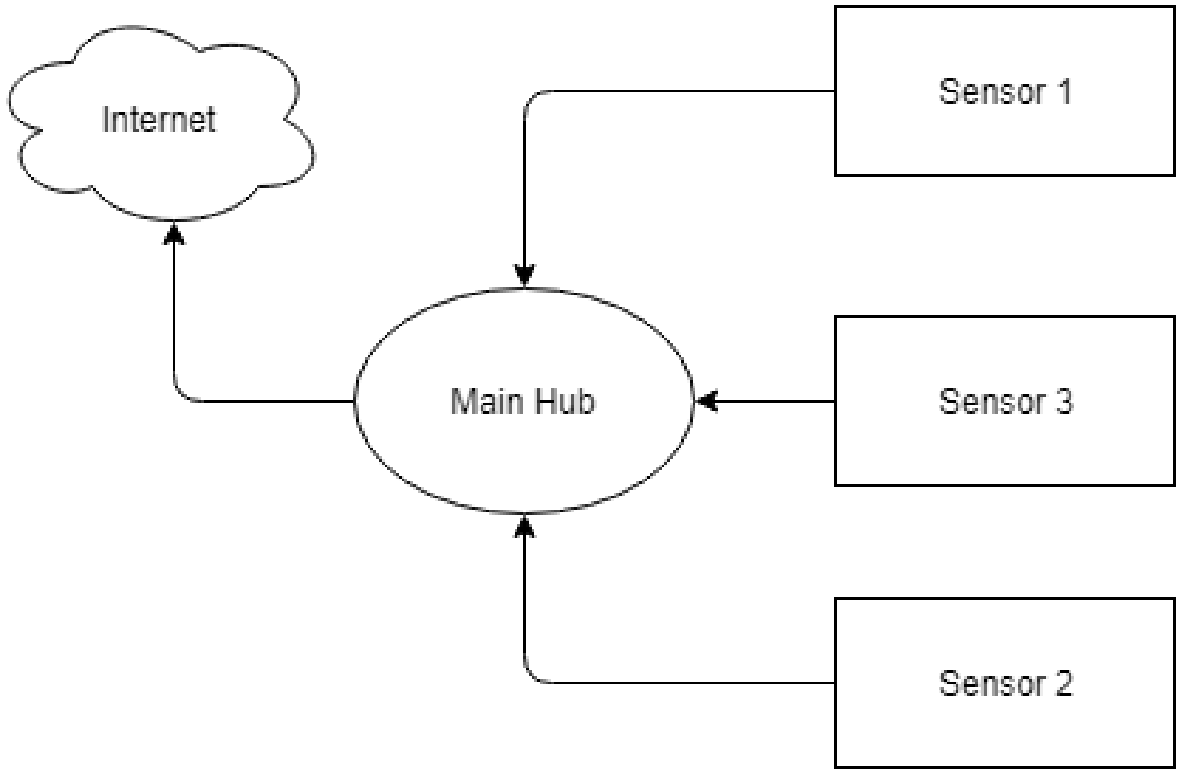
- Arduino Nano
  - Sensor Controllers
    - Obtain Data
  - Send to central hub
  - Small, but less pins
- Arduino Mega2560
  - Central Hub
    - Receives Data
    - Upload to Web
  - A lot of pins
  - Board expansion supports for internet connectivity
  - Large in comparison to the Nano

Sensor

- Ultrasonic
  - Home vs. Not
    - I.e. Car
  - Major issue with Reflection
    - Not using on moving or curved objects
- Current Transformer
  - Detect the status of a hairdryer
  - Issue: Unavailable when it is applied on multi-core cable.

End Goal

- Create a concept design
- < $500
- Prototype

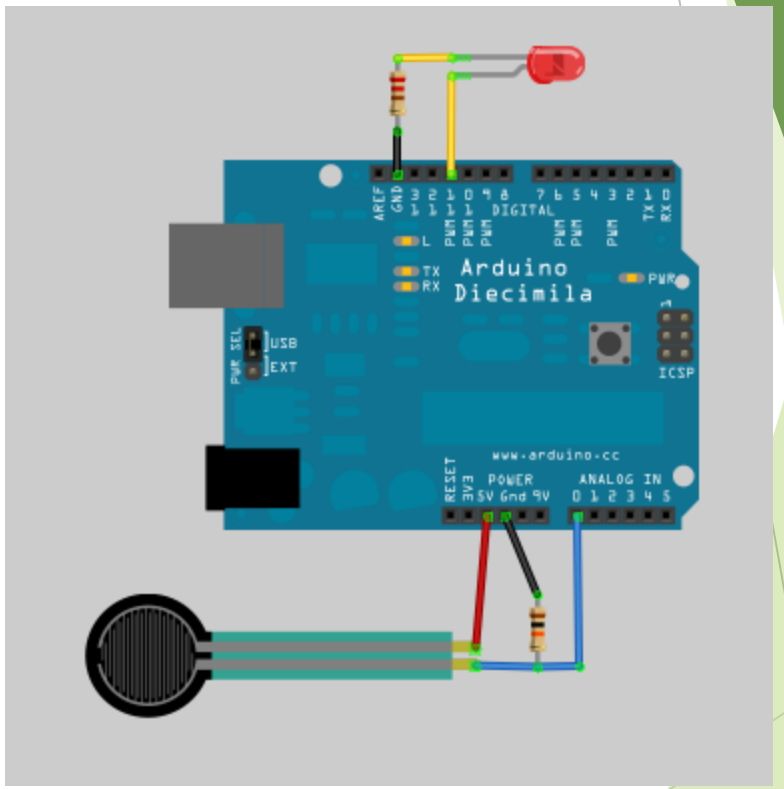


Overall Idea

FSR Update

Purpose:

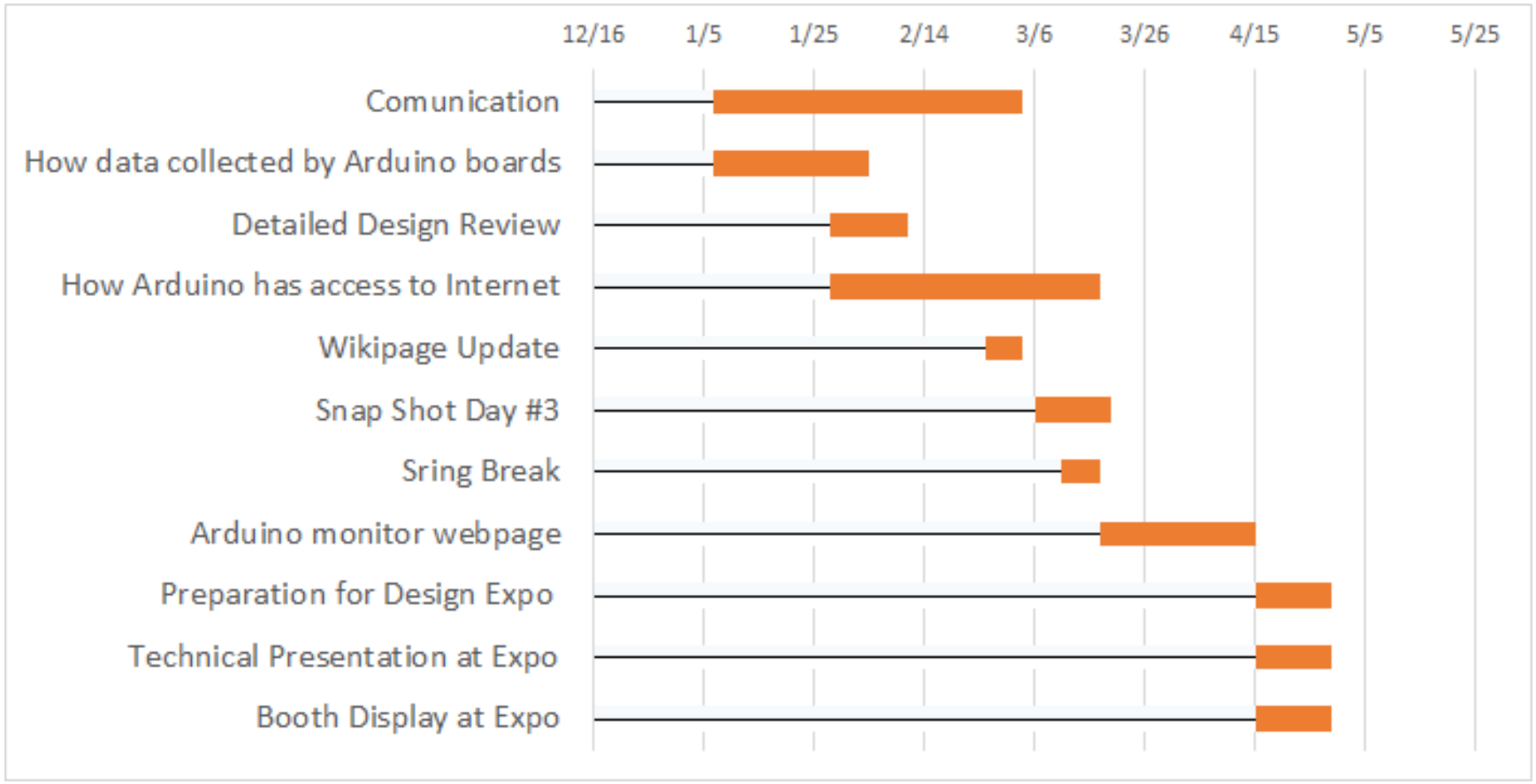
Detect whether the fridge is open to make sure the safety of
the electrical device, even the door in the bedroom



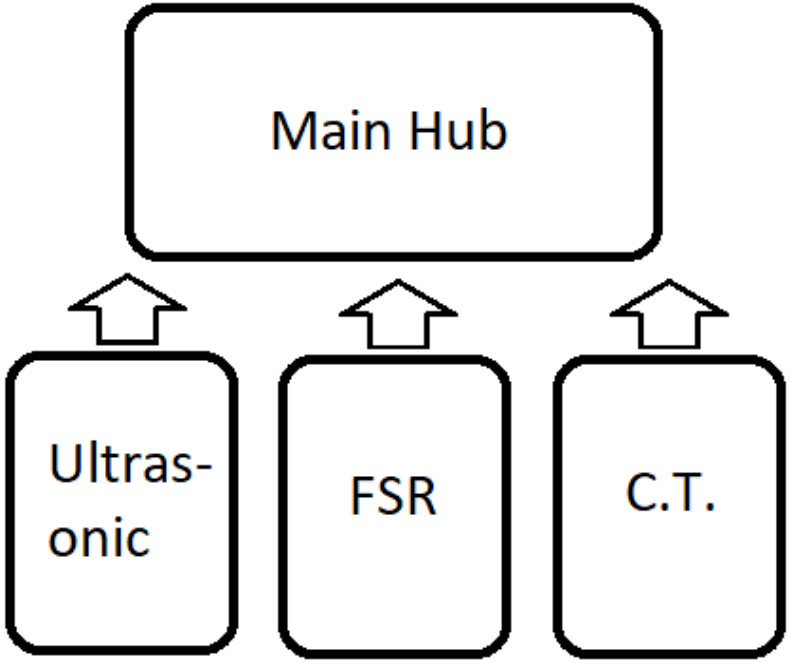
Result:

Finally we can make the bulb light be pressing the FSR sensor

Remaining Schedule

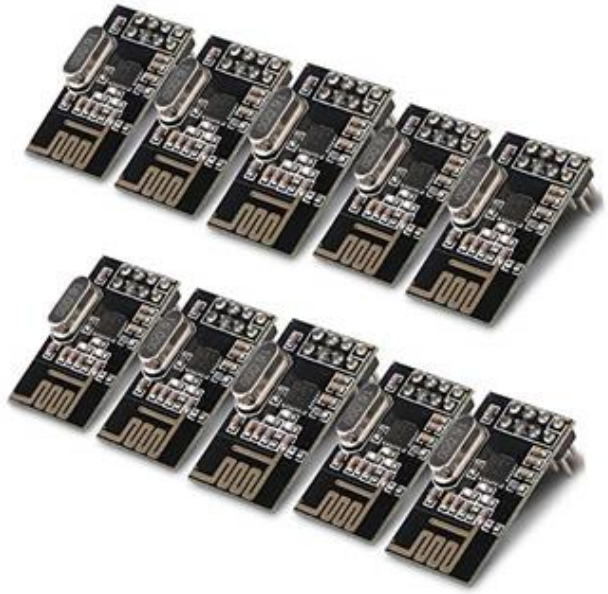


Board-to-Board Communication



Options

Approach 1: General RF Transceiver



nRF24L01

Approach 2: Zigbee

DIGI XBEE® S2C

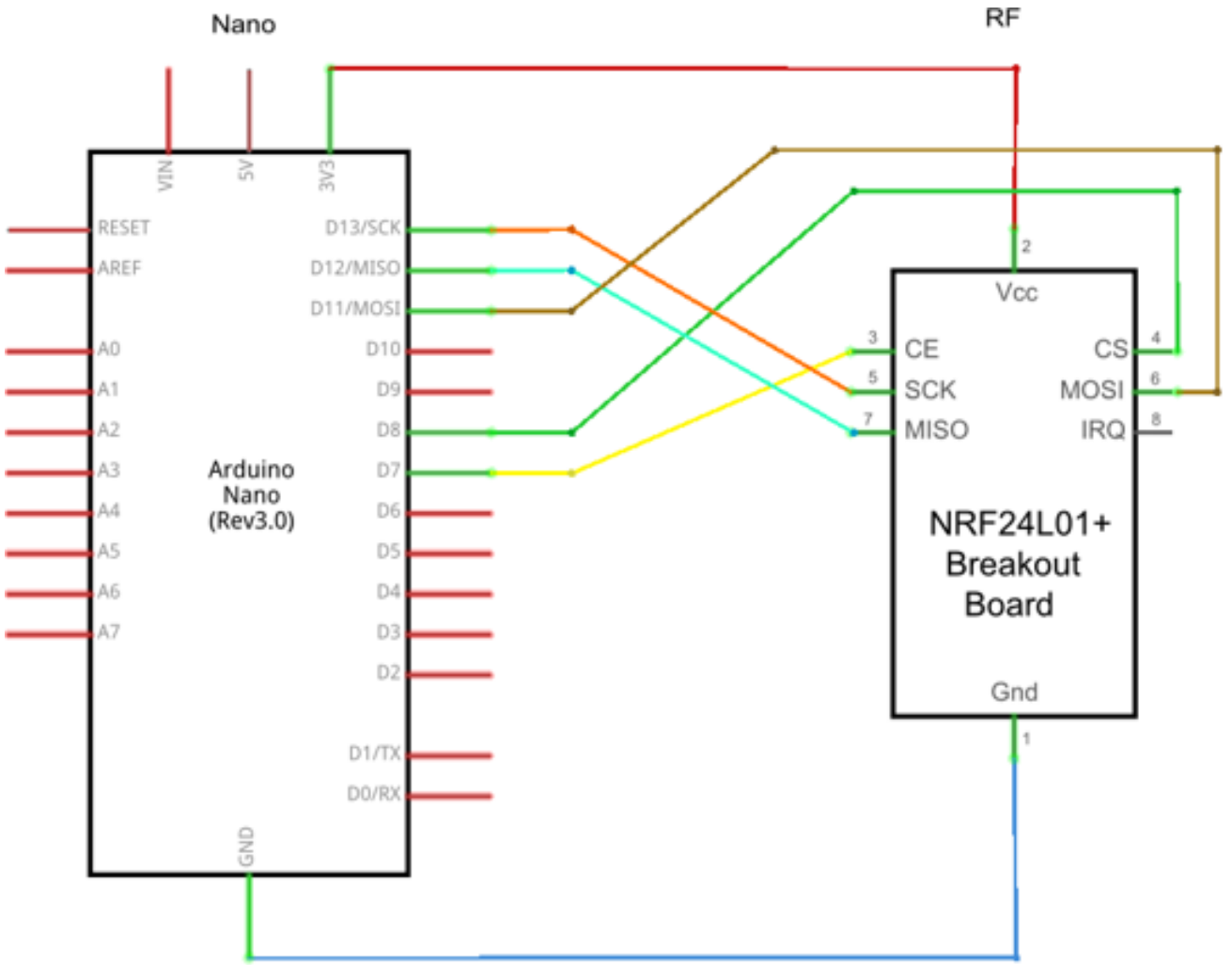
Comparison

Xbee S2C	nRF24L01
• Indoor range – up to 60 m	• 10 – 150 m range
• Transmit current – 33 mA (Normal)	• 11mA TX at 0dBm output power, 14mA RX at 2 Mbps air data rate
• 16 Direct sequence channels	• 6 data pipe MultiCeiver™

We prefer nRF24L01!

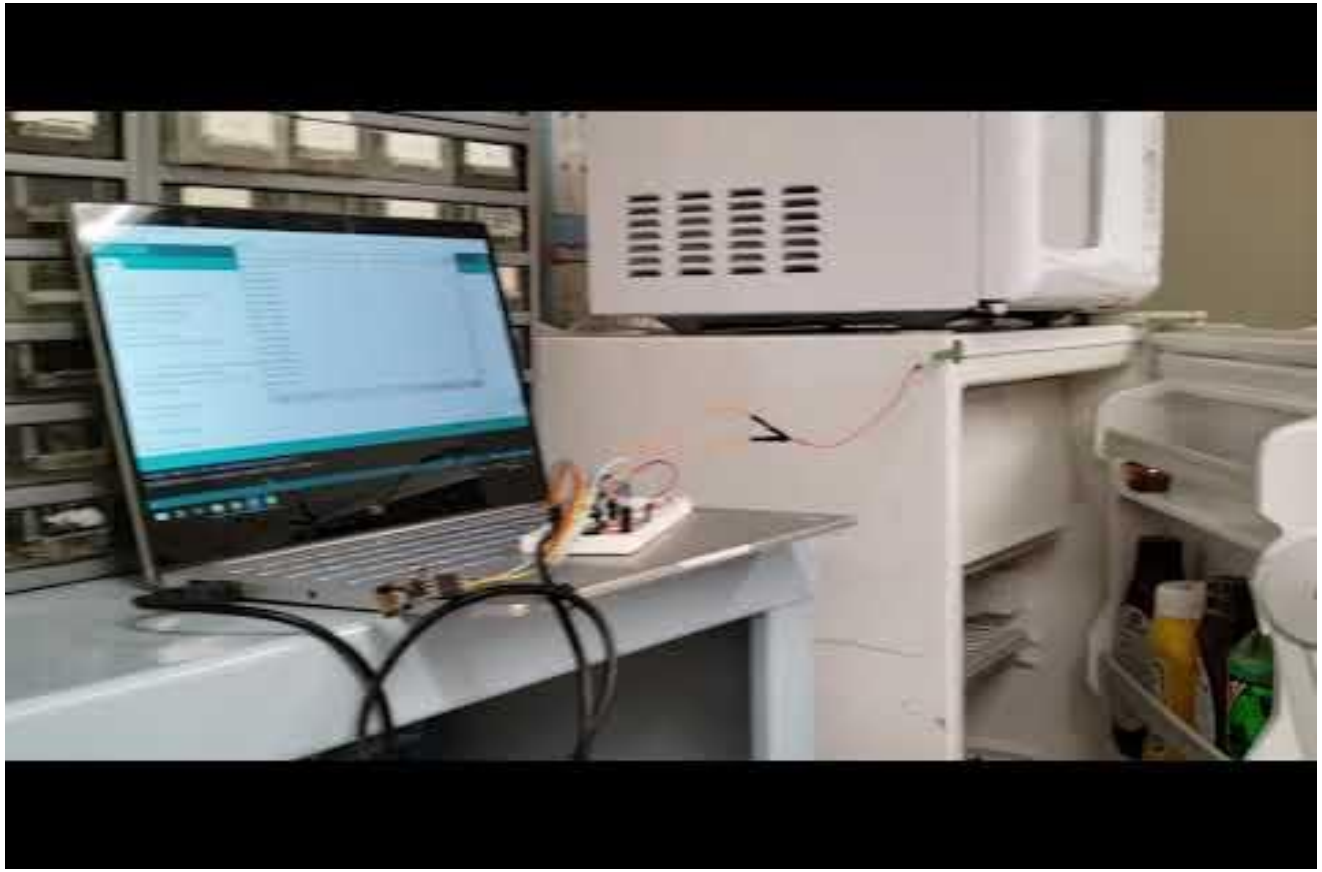
- The system is designed so it should be able to operate in a range of room sizes.
- The design requires several devices, 16-channel is good but a little waste.
- nRF24L01 is Cheap and efficient.

How it works? - SPI



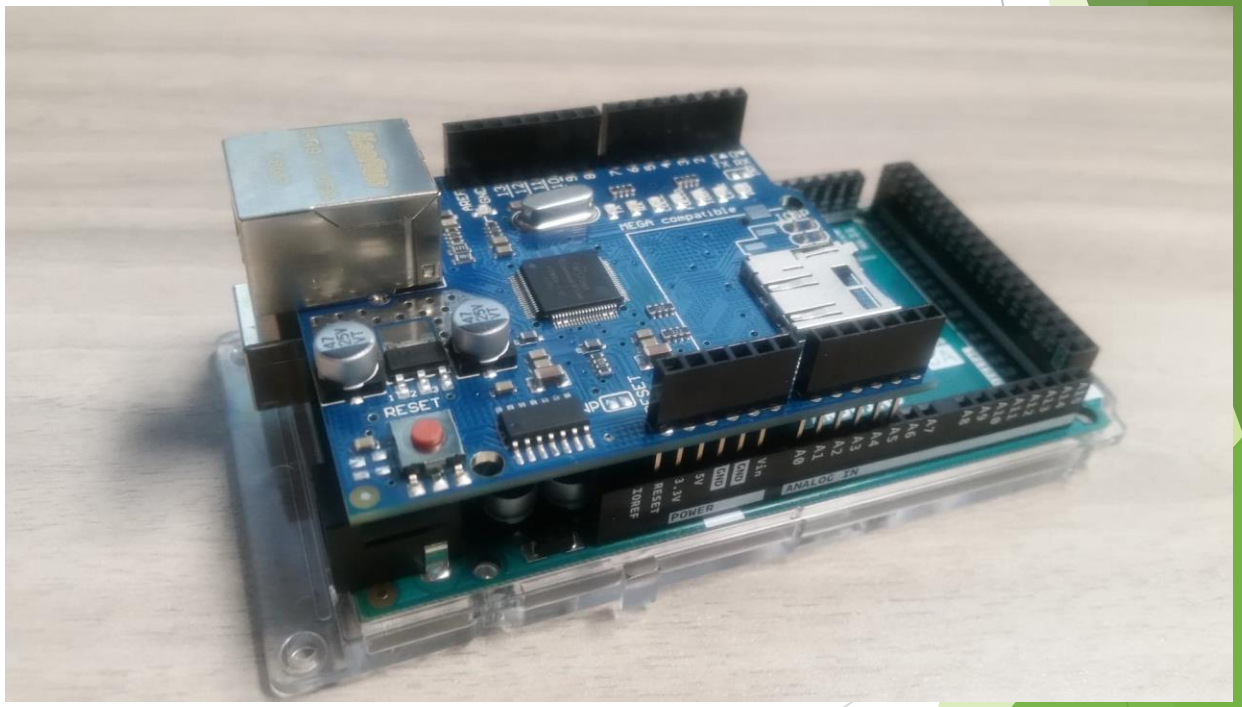
Board Communication Test on FSR

(The experiment we made on fridge in Senior Design Lab)



Ethernet Shield

- How we are connecting the Arduino to the internet.
- Simple connectivity and data placement to the web



Ethernet communication

Issues

Power consumption

- Devices will either be outlet supplied or battery + sleep mode
- This issue can be worried about later down the road, prototype first

NRF24L01 does not work with the Arduino Mega2560

- Change central Hub to Arduino Uno

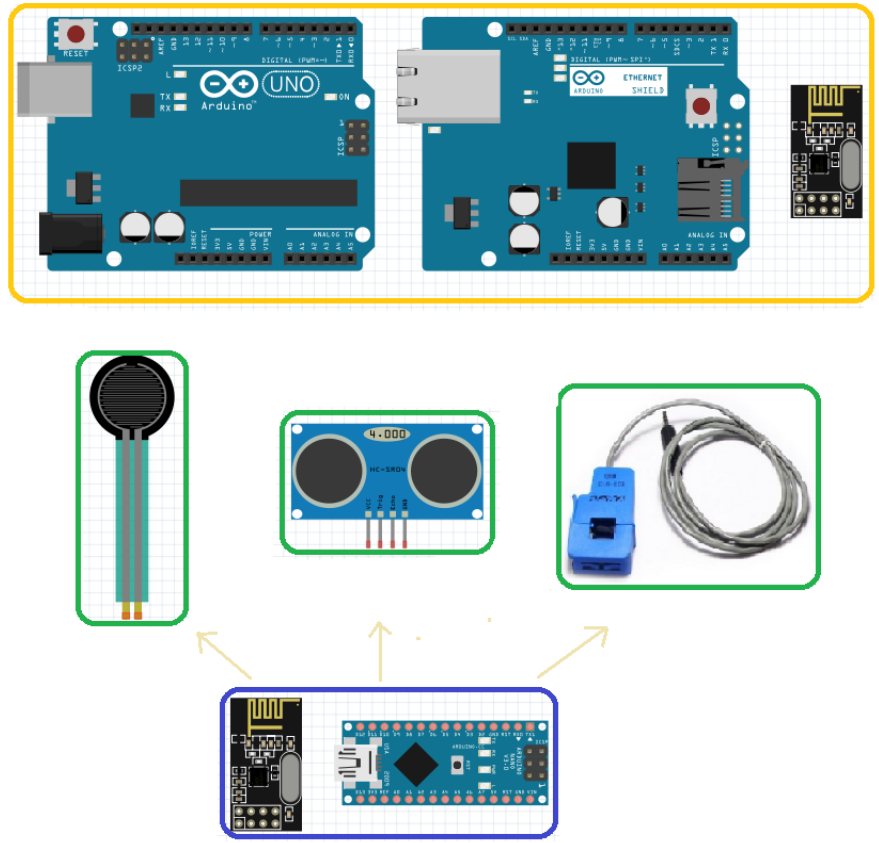
End Design

Components Needed

- 1 per sensor
  - Controller
  - Communication device to hub
- 1 Main hub
  - 1 Ethernet
  - 1 Communication device to sensors

Prototype uses

- 3 Arduino Nanos
  - 1 Ultrasonic
  - 1 FSR
  - 1 Current Transformer
- 1 Arduino Uno
  - 1 Ethernet Shield
- 4 RF transceivers



Budget

Item	Quantity	Individual Cost	Cost Total
Arduino Nano	2	22	44
Jumper Wires	2	1.95	3.9
Current Transformer	1	8.3	8.3
FSR	2	9.1	18.2
NRF24L01 x10	1	12	12
Breakout adapter x4	2	9	18
Ethernet Shield	1	16	16
Total	-	-	120.4
Budget	-	-	500
Remaining	-	-	379.6

- Items not accounted for but have
  - Ultrasonic
  - Arduino Uno
  - Bread boards
  - Measuring devices
    - Oscilloscope
    - Multimeters

Potential Risks

- FSR can be fragile
  - Consider changing trigger device
- Current web server is accessible to anyone
  - Create some sort of password system for cite
- Ultrasonic works best with stationary objects.
  - Not used on movement detection.

Questions